

# Lightweight High Efficiency Electric Motors and Actuators for Low Temperature Mobility and Robotics Applications, Phase I

Completed Technology Project (2010 - 2010)



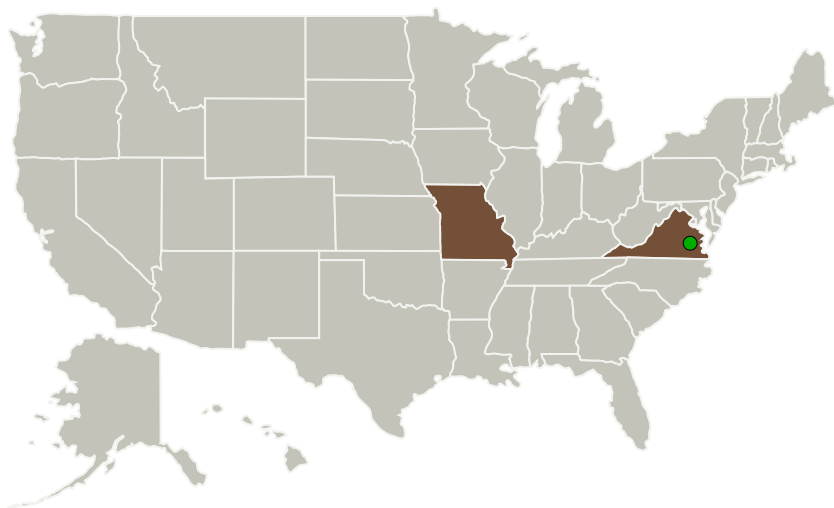
## Project Introduction

Space Exploration Vehicles and Lunar Surface Systems require electromechanical systems that are varied and include long life capability, high reliability, high thermal tolerance, high vacuum tolerance, significantly lower mass and volume, higher mass specific power and improved efficiency over the state of practice components/systems. Space, Weight, Power efficiency, and Cost (SWaP-C) are the key performance drivers for most designs. The objective of this proposal is to demonstrate QM Power's high performance motor and actuator technology called Parallel Magnetic Circuit (PMC

TM

) that excels at all of those key performance parameters in low temperature lunar environments. PMC motors and actuators have higher power density (over 20% lower weight and volume than alternative high performance electric motors and actuators), higher torque density, run cooler, and operate more efficiently (over 90-94%) over a wider power output range than any known conventional AC or DC motors or actuators.

## Primary U.S. Work Locations and Key Partners



Lightweight High Efficiency Electric Motors and Actuators for Low Temperature Mobility and Robotics Applications, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

# Lightweight High Efficiency Electric Motors and Actuators for Low Temperature Mobility and Robotics Applications, Phase I

Completed Technology Project (2010 - 2010)



Organizations Performing Work	Role	Type	Location
QM Power, Inc.	Lead Organization	Industry	Boston, Massachusetts
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Missouri	Virginia

## Project Transitions

**January 2010:** Project Start

**July 2010:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140097>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

QM Power, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

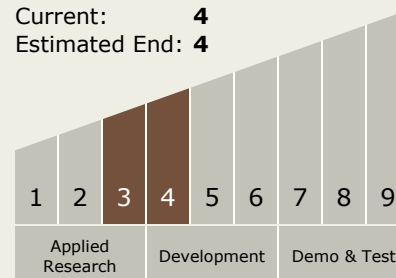
Carlos Torrez

### Principal Investigator:

Charles R Flynn

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



# Lightweight High Efficiency Electric Motors and Actuators for Low Temperature Mobility and Robotics Applications, Phase I

Completed Technology Project (2010 - 2010)



## Technology Areas

### Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.3 Mechanical Systems
    - └ TX12.3.2 Electro-Mechanical, Mechanical, and Micromechanisms

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System